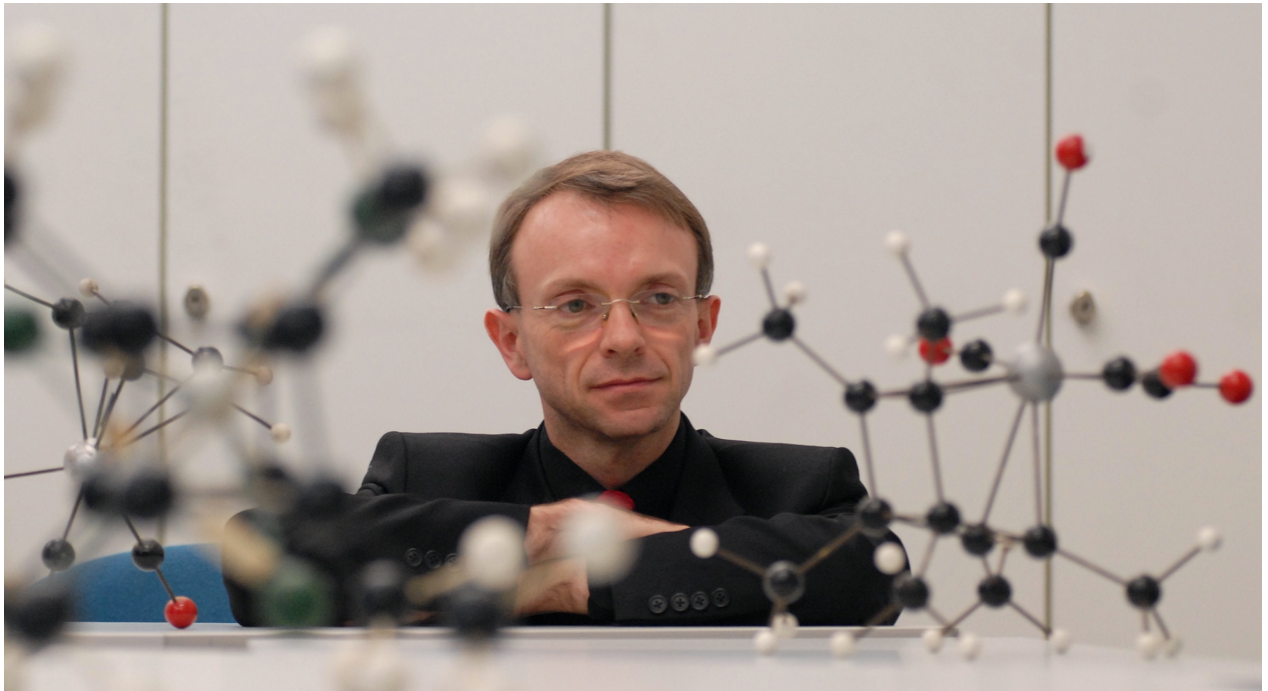


Promotionen in der Arbeitsgruppe

von

Fritz E. Kühn

(2001-2022)

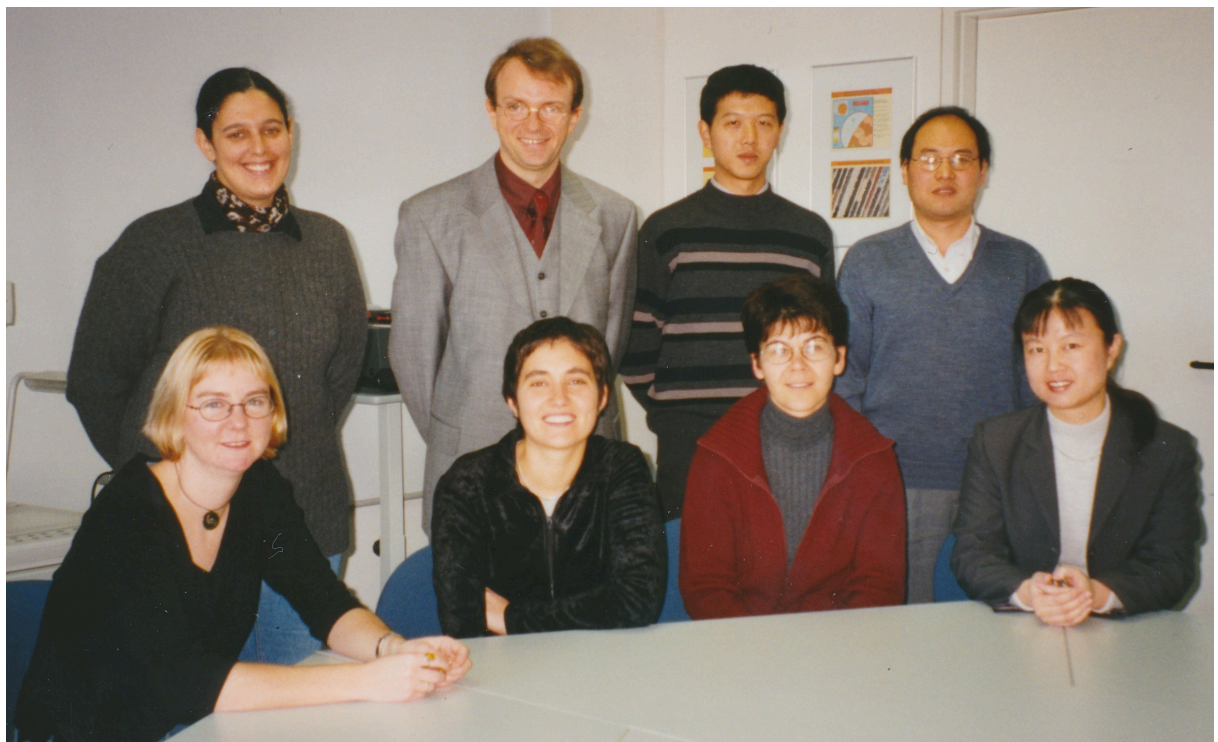


Prof. Dr. Fritz E. Kühn 2008



Die Arbeitsgruppe 1998 (oben)

Die Arbeitsgruppe 2000 (unten)



Guofang Zhang

(August 2001, Promotion des Katholischen Akademischen Ausländerdienstes (KAAD))

April 1998 – September 2001

"Synthesis and Characterization of Metal-Metal Multiply Bonded Complexes and Catalytic Application of Solvent Stabilized Transition Metal Complexes for Polymerizaion of Olefins"



Abb.1: Priv. Doz. Dr. Dr. Kühn (links) und Dr. Guofang Zhang

Gemeinsame Publikationen:

- 1) G. Zhang, J. Zhao, G. Raudaschl-Sieber, E. Herdtweck, F. E. Kühn*, *Polyhedron* **2002**, 21, 1737 - 1746 (Synthesis and characterization of dimolybdenum and dirhodium complexes containing 2-pyridylphosphine ligands).
- 2) M. Pillinger, I. S. Gonçalves*, A. D. Lopes, P. Ferreira, J. Rocha, G. Zhang, M. Schäfer, O. Nuyken, F. E. Kühn*, *Phys. Chem. Chem. Phys.* **2002**, 4, 696-702 (Mesoporous silica grafted with multiply bonded dimolybdenum cations: XAFS analysis and catalytic activity in cyclopentadiene polymerisation).
- 3) F. E. Kühn*, D. Schön, G. Zhang, O. Nuyken*, *J. Macromol. Sci. Chem.* **2000**, A37, 971-981 (Monometallic Solvent Stabilized Transition Metal Cations as Initiators for Cyclopentadiene Polymerization).
- 4) P. Ferreira, I. S. Gonçalves, F. E. Kühn, M. Pillinger, J. Rocha*, A. Thursfield, W.-M. Xue, G. Zhang, *J. Mater. Chem.* **2000**, 10, 1395-1401 (Synthesis and characterization of MCM-41 supported dimolybdenum complexes).
- 5) W.-M. Xue, F. E. Kühn*, G. Zhang, E. Herdtweck, *J. Organomet. Chem.* **2000**, 596, 177-182 (Synthesis and characterization of [trans-di(μ -acetato)(μ -bis(diphenylphosphino)-methylamine)bis(pyridine)dimolybdenum(II)]bis(tetrafluoroborate) and derivatives).
- 6) W.-M. Xue, F. E. Kühn*, G. Zhang, E. Herdtweck, G. Raudaschl-Sieber, *J. Chem. Soc., Dalton Trans.* **1999**, 4103-4110 (Dimolybdenum(II) complexes linked by axial cyano bridges to organic and organometallic ligands: syntheses, structures, and characterization).
- 7) F. E. Kühn*, J. R. Ismeier, D. Schön, W. M. Xue, G. Zhang, O. Nuyken, *Macromol. Rapid Commun.* **1999**, 20, 555-559 (Solvent stabilized transition metal cations as initiators for cyclopentadiene polymerization).
- 6) M. Vierle, Y. Zhang, A. M. Santos, K. Köhler, C. Haeßner, E. Herdtweck, M. Bohnenpoll, O. Nuyken*, F. E. Kühn*, *Chem. Eur. J.* **2004**, 10, 6323-6332 (Solvent-Ligated Manganese(II) Complexes for the Homopolymerization of Isobutene and the Copolymerization of Isobutene and Isoprene).
- 7) S. Gago, Y. Zhang, A. M. Santos, K. Köhler, F. E. Kühn*, J. A. Fernandes, M. Pillinger, A. A. Valente, T. M. Santos, P. J.A. Ribeiro-Claro, I. S. Gonçalves*, *Microp. Mesopor. Mater.* **2004**, 76, 131-136 (Synthesis and characterization of a manganese(II) acetonitrile complex supported on functionalized MCM-41).

- 8) F. E. Kühn*, J.-L. Zuo, F. Fabrizi de Biani, A. M. Santos, Y. Zhang, J. Zhao, A. Sandulache, E. Herdtweck, *New J. Chem.* **2004**, 28, 43 - 51 (4-Ethynylpyridine as bridging moiety in mixed Ru/Re complexes).
- 9) M. Vierle, Y. Zhang, E. Herdtweck, M. Bohnenpoll, O. Nuyken*, F. E. Kühn*, *Angew. Chem.* 2003, 115, 1345-1349; *Angew. Chem. Int. Ed. Engl.* **2003**, 42, 1307-1310 (Highly Reactive Polyisobutenes Prepared with Manganese(II) Complexes as Initiators).

Yanmei Zhang

(November 2004)

November 2001 – Januar 2005

"Synthesis and Characterization of Solvent Ligated Transition Metal Complexes Containing Weakly Coordinating Anions and Their Catalytic Reactivity"



Abb. 2: Priv. Doz. Dr. Dr. Kühn (links) und Dr. Yanmei Zhang

Gemeinsame Publikationen:

- 1) A. K. Hijazi, H. Y. Yeong, Y. Zhang, E. Herdtweck, O. Nuyken*, F. E. Kühn*, *Macromol. Rapid Com.*, **2007**, 28, 670-675 (Isobutene Polymerization Using $[\text{Cu}^{\text{I}}(\text{NCCH}_3)_6]^{2+}$ with Non Coordinating Anions as Catalysts).
- 2) Y. Zhang, W. Sun, C. Freund, A. M. Santos, E. Herdtweck, J. Mink, F. E. Kühn*, *Inorg. Chim. Acta*, **2006**, 359, 4723-4729 (Cationic copper(I) and silver(I) nitrile complexes with fluorinated weakly coordinating anions: Metal-nitrile bond strength and its influence on the catalytic performance).
- 3) O. Nuyken*, M. Vierle, F. E. Kühn, Y. Zhang, *Macromol. Symp.*, **2006**, 236, 69-77 (Solvent-Ligated Transition Metal Complexes as Initiators for the Polymerization of Isobutene).
- 4) Y. Zhang, W. Sun, A. M. Santos, F. E. Kühn*, *Catalysis Lett.* **2005**, 101, 35-41 (Synthesis, characterization, and catalytic application of copper(I) nitrile cations with perfluorinated weakly coordinating anions).
- 5) Y. Zhang, A. M. Santos, E. Herdtweck, J. Mink, F. E. Kühn*, *New J. Chem.* **2005**, 29, 366-370 (Organonitrile ligated silver complexes with perfluorinated weakly coordinating anions and their catalytic application for coupling reactions).
- 6) M. Vierle, Y. Zhang, A. M. Santos, K. Köhler, C. Haeßner, E. Herdtweck, M. Bohnenpoll, O. Nuyken*, F. E. Kühn*, *Chem. Eur. J.* **2004**, 10, 6323-6332 (Solvent-Ligated Manganese(II) Complexes for the Homopolymerization of Isobutene and the Copolymerization of Isobutene and Isoprene).
- 7) S. Gago, Y. Zhang, A. M. Santos, K. Köhler, F. E. Kühn*, J. A. Fernandes, M. Pillinger, A. A. Valente, T. M. Santos, P. J.A. Ribeiro-Claro, I. S. Gonçalves*, *Microp. Mesopor. Mater.* **2004**, 76, 131-136 (Synthesis and characterization of a manganese(II) acetonitrile complex supported on functionalized MCM-41).
- 8) F. E. Kühn*, J.-L. Zuo, F. Fabrizi de Biani, A. M. Santos, Y. Zhang, J. Zhao, A. Sandulache, E. Herdtweck, *New J. Chem.* **2004**, 28, 43 - 51 (4-Ethynylpyridine as bridging moiety in mixed Ru/Re complexes).
- 9) M. Vierle, Y. Zhang, E. Herdtweck, M. Bohnenpoll, O. Nuyken*, F. E. Kühn*, *Angew. Chem.* 2003, 115, 1345-1349; *Angew. Chem. Int. Ed. Engl.* **2003**, 42, 1307-1310 (Highly Reactive Polyisobutenes Prepared with Manganese(II) Complexes as Initiators).



Berufung von Priv. Doz. Dr. Fritz E. Kühn an das Instituto Tecnológico e Nuclear (ITN) in Sacavem bei Lissabon, 2005 (mit dem Präsidenten (rechts) und dem Dekan Chemie (links)).



Berufung von Prof. Dr. Fritz E. Kühn an die Technische Universität München (TUM), 2006 (mit dem Präsidenten der TUM (links))

Jin Zhao

(März 2005, Promotionsstipendium des Deutschen Akademischen Austauschdienstes (DAAD))

Oktober 2001 – März 2005

" Synthesis and Catalytic Application of Monomeric Organomolybdenum Complexes"



Abb. 3: Jin Zhao

Gemeinsame Publikationen:

- 1) A. M. Al-Ajlouni, D. Veljanovski, A. Capapé, J. Zhao, E. Herdtweck, M. J. Calhorda, F. E. Kühn*, *Organometallics*, **2009**, 28, 639-645 (Kinetic Studies on the Oxidation of Cyclopentadienyl Methyl Tricarbonyl Molybdenum(II) and the use of its Oxidation Products as Olefin Epoxidation Catalysts).
- 2) J. Zhao, K. R. Jain, E. Herdtweck, F. E. Kühn*, *Dalton Trans.*, **2007**, 5567-5571 (Ansa-bridged Cyclopentadienyl Molybdenum and Tungsten Complexes: Synthesis, Structure and Application in Olefin Epoxidation).
- 3) M. Zhou, J. Zhao, J. Li, S. Yue, C. Bao, J. Mink, S. Zang, F. E. Kühn*, *Chem. Eur. J.*, **2007**, 13, 158-166 (MTO Schiff Base Complexes: Synthesis, Structures and Catalytic Application in Olefin Epoxidation).
- 4) J. Zhao, E. Herdtweck, F. E. Kühn*, *J. Organomet. Chem.*, **2006**, 691, 2199-2206 (Chiral ansa-bridged cyclopentadienyl molybdenum complexes: Synthesis, structure and application in asymmetric olefin epoxidation).
- 5) F. E. Kühn*, J. Zhao, W. A. Herrmann*, *Tetrahedron Asym.* **2005**, 16, 3469-3479 (Chiral monomeric organorhenium(VII) and organomolybdenum(VI) compounds as catalysts for chiral olefin epoxidation reactions).
- 6) J. Zhao, A. Sakthivel, A. M. Santos, F. E. Kühn*, *Inorg. Chim. Acta* **2005**, 358, 4201-4207 (Siloxane functionalized cyclopentadienyl-molybdenum complexes: Synthesis, characterization and catalytic application).
- 7) A. Sakthivel, J. Zhao, F. E. Kühn*, *Microp. Mesop. Mater.* **2005**, 86, 341-348 (Grafting of the η^5 -CpMo(CO)₃ moiety on pure and surface modified SBA-15 molecular sieves).
- 8) A. Sakthivel*, J. Zhao, F. E. Kühn*, *Bull. Cat. Soc. Ind.* **2005**, 4, 79-83 (Heterogenization of a Molybdenum Complex on Mesoporous MCM-41).
- 9) A. Sakthivel, J. Zhao, F. E. Kühn*, *Stud. Surf. Sci. and Catal.* **2005**, 156, 237-242 (Grafting of [CpMo(CO)₃]⁻Na⁺ on 3,6-dichloro-pyridazine modified mesoporous MCM-41 and MCM-48 molecular sieves).
- 10) S. Gago, J. E. Rodríguez-Borges, C. Teixeira, A. M. Santos, J. Zhao, M. Pillinger, C. D. Nunes, Z. Petrovski, T. M. Santos, F. E. Kühn, C. C. Romão, I. S. Gonçalves*, *J. Mol. Catal. A: Chem.* **2005**, 236, 1-6 (Synthesis, characterization and catalytic studies of bis(chloro)dioxomolybdenum(vi)-chiral diimine complexes).

- 11) A. Sakthivel, J. Zhao, F. E. Kühn*, *Catalysis Lett.* **2005**, 102, 115-119 (Cyclopentadienyl molybdenum complexes grafted on zeolites – synthesis and catalytic application).
- 12) A. Al-Ajlouni, A. A. Valente, C. D. Nunes, M. Pillinger, A. M. Santos, J. Zhao, C. C. Romão, I. S. Gonçalves*, F. E. Kühn*, *Eur. J. Inorg. Chem.* **2005**, 1716-1723, (Kinetics of Cyclooctene Epoxidation with tert-Butyl Hydroperoxide in the Presence of [MoO₂X₂L]-Type Catalysts (L = Bidentate Lewis Base).
- 13) A. Sakthivel, J. Zhao, G. Raudaschl-Sieber, M. Hanzlik, A. S. T. Chiang, F. E. Kühn*, *Appl. Cat. A: Gen.* **2005**, 281, 267-273 (Heterogenization of chiral molybdenum(VI) dioxo complexes on mesoporous materials and their application in catalysis).
- 14) A. Sakthivel, J. Zhao, M. Hanzlik, A. S. T. Chiang, W. A. Herrmann*, F. E. Kühn*, *Adv. Synth. Catal.* **2005**, 347, 473-483 (Heterogenization of Organometallic Molybdenum Complexes with Siloxane Functional Groups and their Catalytic Application).
- 15) F. E. Kühn*, J. Zhao, M. Abrantes, W. Sun, C. A. M. Afonso, L. C. Branco, I. S. Gonçalves, M. Pillinger, C. C. Romão*, *Tetrahedron Lett.* **2005**, 46, 47-52 (Catalytic olefin epoxidation with cyclopentadienyl-molybdenum complexes in room temperature ionic liquids).
- 16) X. Zhou, J. Zhao, A. M. Santos, F. E. Kühn*, *Z. Naturforsch. B* **2004**, 59b, 1223-1228 (Molybdenum(VI) *cis*-Dioxo Complexes with Chiral Schiff Base Ligands: Synthesis, Characterization, and Catalytic Applications).
- 17) J. J. Haider, R. M. Kratzer, W. A. Herrmann*, J. Zhao, F. E. Kühn*, *J. Organomet. Chem.* **2004**, 689, 3735-3740 (On the way to chiral epoxidations with methyltrioxorhenium(VII) derived catalysts).
- 18) J. Zhao, A. M. Santos, E. Herdtweck, F. E. Kühn*, *J. Mol. Catal. A: Chemical* **2004**, 222, 265-271 (Molybdenum and tungsten complexes of composition (η^5 -C₅R₅)MR'(CO)₃ and their use as olefin epoxidation catalyst precursors).
- 19) A. Sakthivel, J. Zhao, M. Hanzlik, F. E. Kühn*, *Dalton Trans.* **2004**, 3338-3341 (Heterogenisation of CpMo(CO)₃Cl on mesoporous materials and its application as olefin epoxidation catalyst).
- 20) F. E. Kühn*, J.-L. Zuo, F. Fabrizi de Biani, A. M. Santos, Y. Zhang, J. Zhao, A. Sandulache, E. Herdtweck, *New J. Chem.* **2004**, 28, 43 - 51 (4-Ethynylpyridine as bridging moiety in mixed Ru/Re complexes).
- 21) J. Zhao, X. Zhou, A. M. Santos, E. Herdtweck, C. C. Romão, F. E. Kühn*, *J. Chem. Soc. Dalton Trans.* **2003**, 3736-3742 (Molybdenum(VI) *cis*-dioxo complexes bearing sugar derived chiral Schiff-base ligands: synthesis, characterization, and catalytic applications).

- 22) G. Zhang, J. Zhao, G. Raudaschl-Sieber, E. Herdtweck, F. E. Kühn*, *Polyhedron* **2002**, 21, 1737 - 1746 (Synthesis and characterization of dimolybdenum and dirhodium complexes containing 2-pyridylphosphine ligands).



Die Arbeitsgruppe 2005 (oben)



Ulla Hifinger Jan. 2006

Ahmed Hijazi

(Dezember 2006, Promotionsstipendium der BASF AG)

Februar 2004 – Dezember 2006

"Synthesis, Characterization and Immobilization of Solvent Ligated Complexes and their Catalytic Activity"



Abb. 4: Prof. Dr. Klaus Köhler, Prof. Oskar Nuyken, Dr. Ahmed Hijazi, Prof. Dr. Fritz E. Kühn (von links).

Gemeinsame Publikationen:

- 1) A. M. Ajlouni, A. K. Hijazi, Z. A. Taha, W. Al Momani, A. Okour, F. E. Kühn, *Catal. Lett.*, **2019**, *in press* (Synthesis, Characterization and Biological Activities of Propionitril: Ligated Transition Metal Complexes with $B(C_6F_5)_4$ as Counter Anion).
- 2) A. K. Hijazi*, Z. A. Taha, A. M. Ajlouni, W. M. Al-Momani, T. S. Ababneh, H. M. Alshare, Fritz E. Kühn, *Appl. Organomet. Chem.*, **2017**, 31, e3601 (Synthesis, Catalytic and Biological Activities and a Computational Study on Fe(III) Solvent Ligated Complexes having $B(Ph)_4$ as a Counter Anion).
- 3) A. K. Hijazi*, Z. A. Taha, A. Ajlouni, N. Radhakrishnan, B. Voit, F. E. Kühn*, *J. Organomet. Chem.*, **2014**, 763, 65-68 (Improved Synthesis, Characterization and Catalytic Application of $[H(OEt)_2][B\{C_6H_3(m-CF_3)_2\}_4]$).
- 4) Z. A. Taha, A. Ajlouni, A. K. Hijazi, F. E. Kühn, E. Herdtweck*, *Acta Cryst.*, **2012**, E68, 156-157 (Redetermination of the crystal structure of tetraaqua gadolinium trinitrate dihydrate $[Gd(NO_3)_3(H_2O)_4] \cdot 2H_2O$).
- 5) Y. Li, L. T. Voon, H. Y. Yeong, A. K. Hijazi, N. Radhakrishnan, K. Köhler, B. Voit, O. Nuyken*, F. E. Kühn*, *Chem. Eur. J.*, **2008**, 14, 7997-8003 (Solvent Ligated Copper(II) Complexes for the Homopolymerization of 2-Methylpropene).
- 6) A. K. Hijazi, A. Al Hmaideen, S. Syukri, N. Radhakrishnan, E. Herdtweck, B. Voit, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2008**, 2892-2898 (Synthesis and Characterization of Acetonitrile Ligated Transition Metal Complexes Containing Tetrakis{(pentafluorophenyl)}borate as Counter Anions).
- 7) N. Radhakrishnan, A. K. Hijazi, H. Komber, B. Voit*, S. Zschoche, F. E. Kühn, O. Nuyken, M. Walter, P. Hanefeld, *J. Polymer Sci.: Chem.*, **2007**, 45, 5636-5648 (Synthesis of Highly Reactive Polyisobutylenes Using Solvent-Ligated Manganese(II) Complexes as Catalysts).
- 8) A. K. Hijazi, N. Radhakrishnan, K. R. Jain, E. Herdtweck, O. Nuyken, H. M. Walter, P. Hanefeld, B. Voit*, F. E. Kühn*, *Angew. Chem.*, **2007**, 119, 7428-7430; *Angew. Chem. Int. Ed.*, 2007, 46, 7290-7292 (dt: Molybdän(III)-Verbindungen als Katalysatoren für die Polymerisation von 2-Methylpropen; engl: Molybdenum(III) Compounds as Catalysts for 2-Methylpropene Polymerization).
- 9) A. K. Hijazi, H. Y. Yeong, Y. Zhang, E. Herdtweck, O. Nuyken*, F. E. Kühn*, *Macromol. Rapid Com.*, **2007**, 28, 670-675 (Isobutene Polymerization Using $[Cu^I(NCCH_3)_6]^{2+}$ with Non Coordinating Anions as Catalysts).

- 10) Syukri, A. K. Hijazi, A. Sakthivel, A.I. Al-Hmaideen, F. E. Kühn*, *Inorg. Chim. Acta*, **2007**, 360, 197-202 (Heterogenization of Solvent-Ligated Copper (II) Complexes on Poly(4-vinylpyridine) for the Catalytic Cyclopropanation of Olefins).
- 11) A. Sakthivel, A. K. Hijazi, A. I. Al Hmaideen, F. E. Kühn*, *Micropor. Mesopor. Mater.*, **2006**, 96, 293-300 (Grafting of $[\text{Cu}(\text{NCCH}_3)_6] [\text{B}\{\text{C}_6\text{H}_3(m\text{-CF}_3)_2\}_4]_2$ on the surface of aminosilane modified SBA-15).
- 12) A. Sakthivel, Syukri, A. K. Hijazi, F. E. Kühn*, *Catal. Lett.*, **2006**, 111, 43-48 (Heterogenization of $[\text{Cu}(\text{NCCH}_3)_4][\text{BF}_4]_2$ on mesoporous AIMCM-41 / AIMCM-48 and its application as cyclopropanation catalyst).
- 13) A. Sakthivel, A. Hijazi, H. Yeong, K. Köhler, O. Nuyken, F. E. Kühn*, *J. Mater. Chem.* **2005**, 15, 4441-4445 (Heterogenization of a manganese(II) acetonitrile complex on AIMCM-41 and AIMCM-48 molecular sieves by ion exchange).
- 14) A. Sakthivel, A. K. Hijazi, M. Hanzlik, A. S. T. Chiang, F. E. Kühn*, *Appl. Cat. A: General* **2005**, 294, 161-167 (Heterogenization of $[\text{Cu}(\text{NCCH}_3)_6][\text{B}(\text{C}_6\text{F}_5)_4]_2$ and its application in catalytic olefin aziridination).

Die Arbeitsgruppe 2006



Filipe M. Pedro

(April 2007, Promotionsstipendium der Portugiesischen Forschungsförderung(FCT))

Februar 2003 – Mai 2007

"Application of Rhenium and Ruthenium Organometallic Complexes in Carbonyl Olefination"



Abb. 5: Prof. Dr. Klaus Köhler, Prof. Dr. Oskar Nuyken, Dr. Filipe M. Pedro, Prof. Dr. Fritz E. Kühn (von links).

Gemeinsame Publikationen:

- 1) A. Sakthivel, F. E. Pedro, A. S. T. Chiang, F. E. Kühn*, *Dalton Trans.*, **2007**, 320-326 (Grafting of Cyclopentadienyl Ruthenium Complexes on aluminosilane linker modified mesoporous SBA-15 silicates).
- 2) F. M. Pedro, A. M. Santos, W. Baratta, F. E. Kühn*, *Organometallics*, **2007**, 26, 302-309 (Organometallic Ruthenium Complexes: Application in the Olefination of Carbonyl Compounds).
- 3) S. M. Bruno, B. Monteiro, M. Salette Balula, F. M. Pedro, M. Abrantes, A. A. Valente, M. Pillinger, P. Ribeiro-Claro, F. E. Kühn, I. S. Gonçalves*, *J. Mol. Catal. A. Chem.*, **2006**, 260, 11-18, (Synthesis and catalytic properties of chiral oxazoline dioxomolybdenum(VI) complexes).
- 4) A. Sakthivel, F. E. Pedro, A. T. S. Chiang, F. E. Kühn*, *Synthesis*, **2006**, 10, 1682-1688 (Heterogenization of $(\eta^5\text{-C}_5\text{Me}_5)\text{Ru}(\text{PPh}_3)_2\text{Cl}$ and its catalytic application for cyclopropanation of styrene using ethyl diacetate).
- 5) F. M. Pedro, S. Hirner, F. E. Kühn*, *Tetrahedron Lett.* **2005**, 46, 7777-7779 (Catalytic ketone olefination with methyltrioxorhenium).
- 6) A. M. Santos, F. M. Pedro, A. A. Jogalekar, Isabel S. Lucas. C. C. Romão*, F. E. Kühn*, *Chem. Eur. J.* **2004**, 10, 6313-6321 (Oxorhenium Complexes as Aldehyde-Olefination Catalysts).
- 7) F. E. Kühn*, A. M. Santos, A. A. Jogalekar, F. M. Pedro, P. Rigo, W. Baratta*, *J. Catal.* **2004**, 227, 253-256 (Highly selective organometallic ruthenium catalysts for aldehyde olefination).



Sekretärinnen: Ulla Hifinger (rechts) und ihre Schwangerschaftsvertretung von 2008, Monika Matejcek (links)

Syukri Syukri

(Juni 2007, Promotionsstipendium der Asian Development Bank)

November 2004 – Juni 2007

"Immobilization of Solvent Stabilized Transition Metal Complexes with Weakly Coordinating Counter Anions and Their Catalytic Applications"



Abb 6: Prof. Dr. Fritz E. Kühn (dritter von links), Dr. Syukri Syukri (fünfter von links mit „Doktorhut“)

Gemeinsame Publikationen:

- 1) S. Syukri, A. Sakthivel, W. Sun, F. E. Kühn*, *Catal. Lett.*, **2009**, 128, 18-24, (Immobilization of Ru(II)(salen)(PPh₃)₂ on Mesoporous MCM-41/SBA-15: Characterization and Catalytic Applications).
- 2) A. K. Hijazi, A. Al Hmaideen, S. Syukri, N. Radhakrishnan, E. Herdtweck, B. Voit, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2008**, 2892-2898 (Synthesis and Characterization of Acetonitrile Ligated Transition Metal Complexes Containing Tetrakis{(pentafluorophenyl)}borate as Counter Anions).
- 3) S. Syukri, C. E. Fischer, A. Al Hmaideen, Y. Li, Y. Zheng, F. E. Kühn*, *Micropor. Mesopor. Mater.*, **2008**, 113, 171-177 (Modified MCM41-Supported Acetonitrile Ligated Copper(II) and its Catalytic Activity in Cyclopropanation of Olefins).
- 4) S. Syukri, W. Sun, F. E. Kühn*, *Tet. Lett.*, **2007**, 1613-1617, (Immobilization of Ruthenium(II) Salen Complexes on Poly(4-vinylpyridine) and their Application in Catalytic Aldehyde Olefination).
- 5) Syukri, A. K. Hijazi, A. Sakthivel, A.I. Al-Hmaideen, F. E. Kühn*, *Inorg. Chim. Acta*, **2007**, 360, 197-202 (Heterogenization of Solvent-Ligated Copper (II) Complexes on Poly(4-vinylpyridine) for the Catalytic Cyclopropanation of Olefins).
- 6) A. Sakthivel, Syukri, A. K. Hijazi, F. E. Kühn*, *Catal. Lett.*, **2006**, 111, 43-48 (Heterogenization of [Cu(NCCH₃)₄][BF₄]₂ on mesoporous AIMCM-41 / AIMCM-48 and its application as cyclopropanation catalyst).



Sekretariats- und technisches Personal Herbst 2007

Die Arbeitsgruppe 2007



Akef al Hmaideen

(August 2008, Promotionsstipendium der BASF AG)

Juli 2005 – November 2008

"Synthesis, Immobilization, and Applications of Solvent Stabilized Transition Metal Cations with Weakly Coordinating Anions"

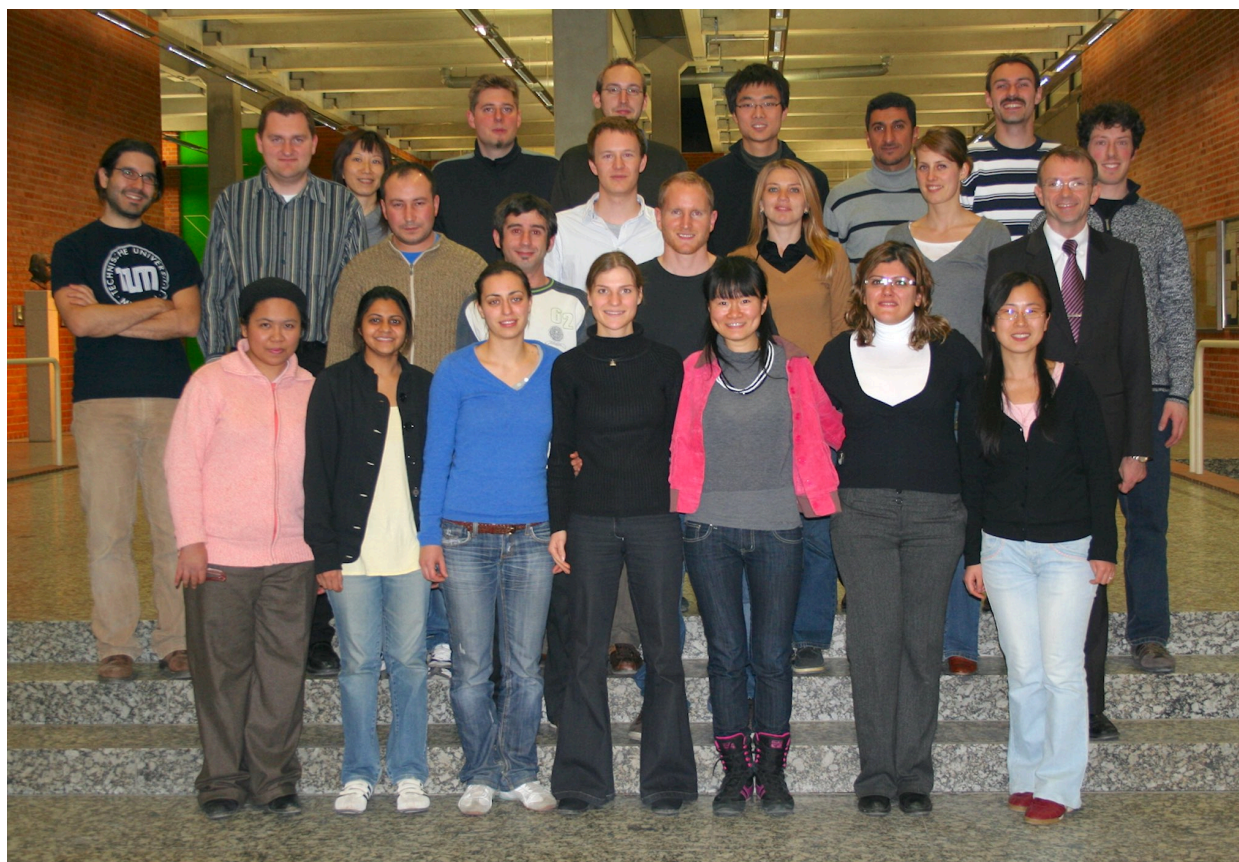


Abb. 7: Prof. Dr. Fritz E. Kühn, Dr. Akef al Hmaideen, Prof. Dr. Johann Plank

Gemeinsame Publikationen:

- 1) A. K. Hijazi, A. Al Hmaideen, S. Syukri, N. Radhakrishnan, E. Herdtweck, B. Voit, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2008**, 2892-2898 (Synthesis and Characterization of Acetonitrile Ligated Transition Metal Complexes Containing Tetrakis{(pentafluorophenyl)}borate as Counter Anions).
- 2) S. Syukri, C. E. Fischer, A. Al Hmaideen, Y. Li, Y. Zheng, F. E. Kühn*, *Micropor. Mesopor. Mater.*, **2008**, 113, 171-177 (Modified MCM41-Supported Acetonitrile Ligated Copper(II) and its Catalytic Activity in Cyclopropanation of Olefins).
- 3) Syukri, A. K. Hijazi, A. Sakthivel, A.I. Al-Hmaideen, F. E. Kühn*, *Inorg. Chim. Acta*, **2007**, 360, 197-202 (Heterogenization of Solvent-Ligated Copper (II) Complexes on Poly(4-vinylpyridine) for the Catalytic Cyclopropanation of Olefins).
- 4) A. Sakthivel, A. K. Hijazi, A. I. Al Hmaideen, F. E. Kühn*, *Micropor. Mesopor. Mater.*, **2006**, 96, 293-300 (Grafting of $[\text{Cu}(\text{NCCH}_3)_6] [\text{B}\{\text{C}_6\text{H}_3(m\text{-CF}_3)_2\}_4]_2$ on the surface of aminosilane modified SBA-15).

Die Arbeitsgruppe 2008



Alejandro Capapé Miralles

(August 2009)

Februar 2006 – August 2009

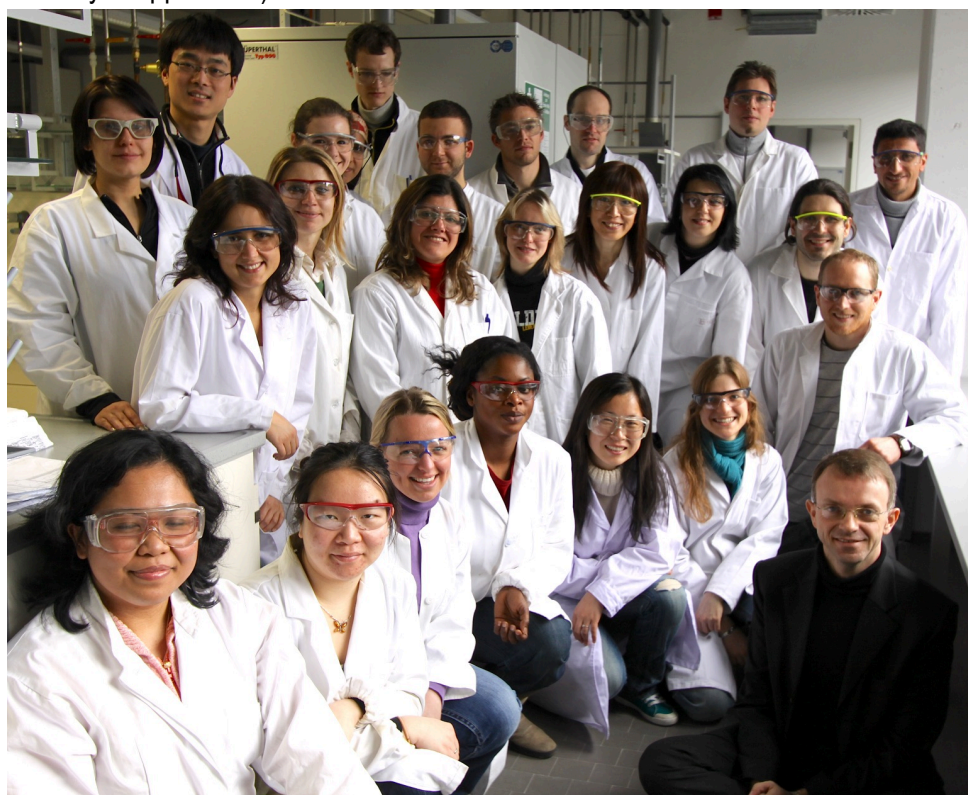
"Rhenium, Molybdenum and Tungsten Organometallic Homogeneous Catalysts. Synthesis, Characterisation, and Application in Olefin Epoxidation"



Abb. 8: Prof. Dr. Fritz E. Kühn, Dr. Alejandro Capapé Miralles

Gemeinsame Publikationen:

- 1) A. Capapé, A. Raith, E. Herdtweck, M. Cokoja, F. E. Kühn*, *Adv. Synth. Catal.*, **2010**, 352, 547-556 (Synthesis and Catalytic Applications of ansa Compounds with Cycloalkyl-Moieties as Bridging Units: A Comparative Study).
- 2) M. D. Zhou, Y. Yu, A. Capapé, K. R. Jain, E. Herdtweck, X. R. Li, J. Li, S. L. Zhang, F. E. Kühn*, *Chem. As. J.*, **2009**, 11, 411-418 (*N*-salicylidene)aniline derived Schiff Base Complexes of Methyltrioxorhenium(VII) – Ligand Influence and Catalytic Performance).
- 3) A. Capapé, A. Raith, F. E. Kühn*, *Adv. Synth. Catal.*, **2009**, 351, 66-70 (Stable and catalytically highly active ansa compounds with cycloalkyl moieties as bridging units).
- 4) A. M. Al-Ajlouni, D. Veljanovski, A. Capapé, J. Zhao, E. Herdtweck, M. J. Calhorda, F. E. Kühn*, *Organometallics*, **2009**, 28, 639-645 (Kinetic Studies on the Oxidation of η^5 -Cyclopentadienyl Methyl Tricarbonyl Molybdenum(II) and the use of its Oxidation Products as Olefin Epoxidation Catalysts).
- 5) A. Capapé, M. D. Zhou, S. L. Zang, F. E. Kühn*, *J. Organomet. Chem.*, **2008**, 693, 3240-3244 (((2-Hydroxynaphtalen-1-yl)methylene)aniline derived Schiff base adducts of MTO – synthesis and catalytic application).



Die Arbeitsgruppe 2009

Alev Günyar

(Januar 2010, Promotionsstipendium des Elite-Netzwerks NanoCat)

März 2007 – Februar 2010

"Molybdenum(VI) Dioxo Complexes: Synthesis, Characterization and Catalytic Application in Olefin Epoxidation"



Abb. 9: Dr. Alev Günyar und Prof. Dr. Fritz E. Kühn

Gemeinsame Publikationen:

- 1) A. Günyar, D. Betz, M. Drees, E. Herdtweck, F. E. Kühn*, *J. Mol. Catal. A; Chem.*, **2010**, 331, 117-124 (Highly soluble dichloro, dibromo and dimethyl dioxomolybdenum(VI)-bipyridin complexes as catalysts for the epoxidation of olefins).
- 2) A. Günyar, F. E. Kühn*, *J. Mol. Catal. A: Chem.*, **2010**, 319, 108-113 (Bidentate Lewis Base Adducts of Molybdenum(VI): Ligand Impact on Catalytic Performance and Stability).
- 3) A. Günyar, M. D. Zhou, M. Drees, P. N. W. Baxter, G. Bassioni, E. Herdtweck, F. E. Kühn*, *Dalton Trans*, **2009**, 40, 8746-8754 (Studies on bis(halogeno) dioxomolybdenum(VI)-bipyridine complexes: synthesis and catalytic activity).
- 4) M. D. Zhou, K. R. Jain, A. Günyar, P. N. W. Baxter, E. Herdtweck, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2009**, 2907-2914 (Bidentate Lewis Base Adducts of Methyltrioxorhenium(VII): Ligand Influence on Catalytic Performance and Stability).
- 5) A. M. Al Ajlouni, A. Günyar, M. Zhou, P. N. W. Baxter, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2009**, 1019-1026 (Adduct Formation of Dichlorodioxomolybdenum(VI) and Methyltrioxorhenium(VII) with a Series of Bidentate Nitrogen Donor Ligands).



Prof. Dr. Fritz E. Kühn mit Tochter Clara in seinem Büro

Kavita R. Jain

(März 2010, Promotionsspendium der Bayerischen Forschungstiftung)

März 2007 – April 2010

"Applications of Transition Metal Complexes in Industrially Significant Processes"



Abb. 10: Prof. Dr. Klaus Köhler, Prof. Dr. Lukas Hintermann, Dr. Kavita R. Jain, Prof. Dr. Fritz E. Kühn

Gemeinsame Publikationen:

- 1) M. D. Zhou, K. R. Jain, A. Günyar, P. N. W. Baxter, E. Herdtweck, F. E. Kühn*, *Eur. J. Inorg. Chem.*, **2009**, 2907-2914 (Bidentate Lewis Base Adducts of Methyltrioxorhenium(VII): Ligand Influence on Catalytic Performance and Stability).
- 2) M. D. Zhou, Y. Yu, A. Capapé, K. R. Jain, E. Herdtweck, X. R. Li, J. Li, S. L. Zhang, F. E. Kühn*, *Chem. As. J.*, **2009**, 11, 411-418 (*N*-salicylidene)aniline derived Schiff Base Complexes of Methyltrioxorhenium(VII) – Ligand Influence and Catalytic Performance).
- 3) K. R. Jain, W. A. Herrmann*, F. E. Kühn*, *Current. Org. Chem.*, **2008**, 12, 1468-1478 (High Oxidation State Transition Metals Ligated with *N*-Heterocyclic Carbenes).
- 4) K. R. Jain, F. E. Kühn*, *Dalton Trans.*, **2008**, 2221-2227 (Immobilization of Monomeric Organometallic Molybdenum Oxo- and Carbonyl Complexes And Their Application in Epoxidation Reactions).
- 5) K. R. Jain, W. A. Herrmann*, F. E. Kühn*, *Coord. Chem. Rev.*, **2008**, 252, 556-568 (Synthesis and Catalytic Applications of Chiral Monomeric Organomolybdenum(VI) and Organorhenium(VII) Oxides in Homogeneous and Heterogeneous Catalysis).
- 6) K. R. Jain, F. E. Kühn*, *J. Organomet. Chem.*, **2007**, 692, 5532-5540 (Immobilization of Organorhenium(VII) Oxides).
- 7) J. Zhao, K. R. Jain, E. Herdtweck, F. E. Kühn*, *Dalton Trans.*, **2007**, 5567-5571 (Ansa-bridged η^5 -Cyclopentadienyl Molybdenum and Tungsten Complexes: Synthesis, Structure and Application in Olefin Epoxidation).
- 8) A. K. Hijazi, N. Radhakrishnan, K. R. Jain, E. Herdtweck, O. Nuyken, H. M. Walter, P. Hanefeld, B. Voit*, F. E. Kühn*, *Angew. Chem.*, **2007**, 119, 7428-7430; *Angew. Chem. Int. Ed.*, 2007, 46, 7290-7292 (dt: Molybdän(III)-Verbindungen als Katalysatoren für die Polymerisation von 2-Methylpropen; engl: Molybdenum(III) Compounds as Catalysts for 2-Methylpropene Polymerization).
- 9) F. E. Kühn*, K. R. Jain, M. Zhou, *Rare Metals*, **2006**, 25, 411-421 (Organorhenium(VII) oxides).